

# Lower Lip Reconstruction Using a Sensory Anterolateral Thigh Flap as the First Choice

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**Summary:** Local flaps from the upper lip and cheeks have been the first choice for two-thirds to total resection of the lower lip. However, these local flap techniques involve many clinical problems, including small a mouth, drooling, scarring, and hypesthesia. The improvement of free anterolateral thigh (ALT) flap transfer can solve these problems with expansion of the application of free flaps for lower lip reconstruction. The patient in this case was a 56-year-old man with squamous cell carcinoma of the lower lip (cT3N1M0). Subtotal lower lip resection preserving both corners of the mouth with bilateral neck dissection was performed. Simultaneously, a sensory ALT flap was elevated with an 8×6 cm skin island and a lateral femoral cutaneous nerve. The lateral and medial sides of the fascia lata were processed into 1-cm-wide strings, which were tunneled through the orbicularis oris muscle of the upper lip and sutured to the orbicularis oris muscle at the mucosal side of the philtrum. The lateral femoral cutaneous nerve and right mental nerve were sutured. At 3 months, a second surgery was performed to replace the ALT flap on the white labial side with a clavicle full-thickness skin graft. This surgery achieved four important factors: opening and closing of the mouth, sensory function of the lower lip, cosmetic appearance, and minimization of donor-site damage. We believe the worldwide improvement of microsurgery techniques enables lower lip reconstruction using the sensory ALT flap to be selected as the first choice for two-thirds to total lower lip defects. (*Plast Reconstr Surg Glob Open* 2023; 11:e5003; doi: [10.1097/GOX.0000000000005003](https://doi.org/10.1097/GOX.0000000000005003); Published online 22 May 2023.)

Lower lip reconstruction using local flaps from the upper lip and cheeks have been selected as a first choice after two-thirds to total lower lip resection.<sup>1-3</sup> The short operation time and color and texture match of transplanted tissue were reasons for selection as the first choice; however, these local flap methods involve many clinical problems, including a small mouth, drooling, and decreased perception in the flap area. In the last 20 years, free flap surgery has become universal, resulting in a lower incidence of vascular anastomosis failure and minimization of donor-site damage. We think that lower lip reconstruction using a free flap for two-thirds to total lower lip defects can be the first choice if it surpasses surgery using local flaps in the following four points: opening and closing function, sensory function, cosmetic appearance, and less donor-site sacrifice. We herein

report a case in which a sensory anterolateral thigh (ALT) flap was considered to be the first choice for subtotal lower lip reconstruction, with excellent results in these four points.

## CASE

A 56-year-old man with no medical history noticed a lower lip tumor that had been gradually increasing in size for 1 year. Squamous cell carcinoma was diagnosed after the examination of a biopsy specimen. After imaging studies, the clinical stage was determined to be cT3N1M0. Subtotal lower lip resection and bilateral supra-omohyoid neck dissection were performed by otolaryngologists, with simultaneous reconstruction performed by our plastic surgery team. A 1-cm surgical margin from the edge of the tumor resulted in a subtotal lower lip defect without resection of the bilateral corners of the mouth. Supra-omohyoid neck dissection resulted in bilateral resection of the facial arteries. Our plastic surgery team elevated an ALT flap from the left thigh during tumor resection. Three perforators from the descending branch of the lateral femoral

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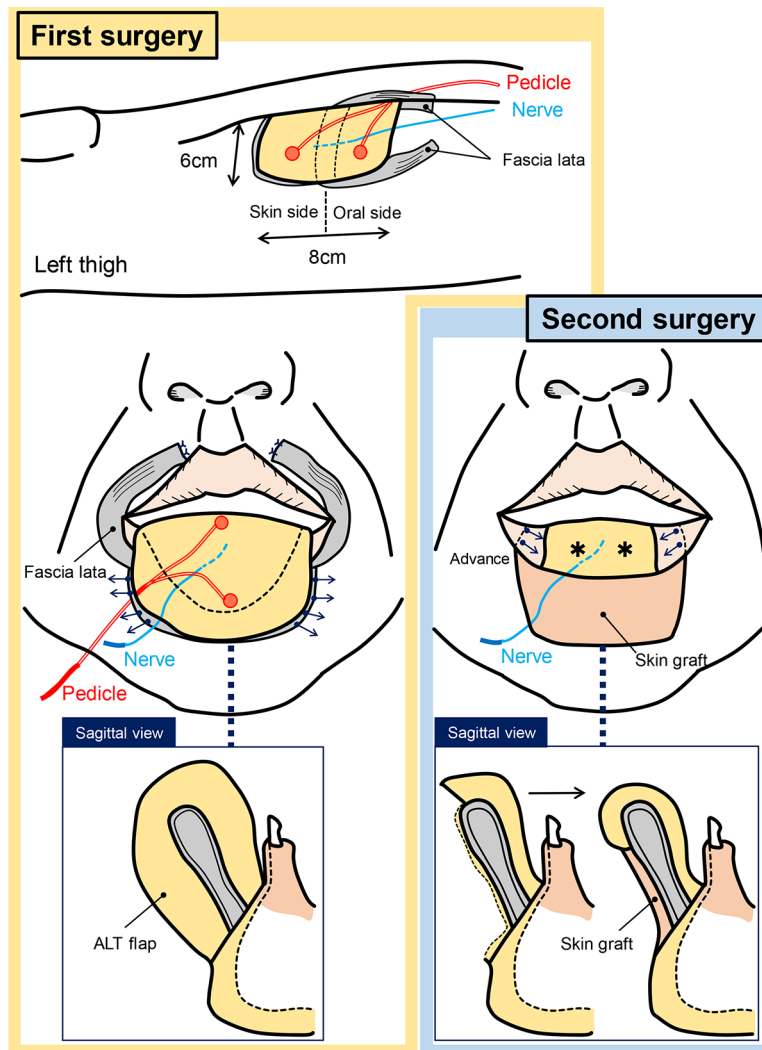
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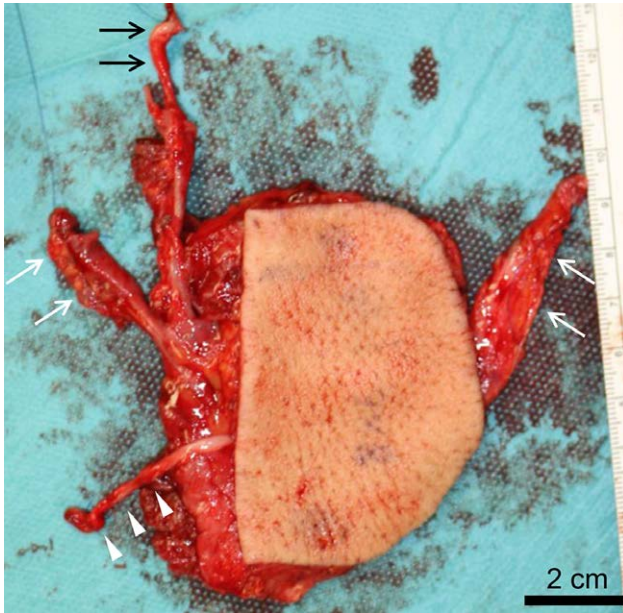
circumflex artery were identified and detached from the vastus lateralis muscle (Fig. 1). An 8×6cm skin island attached to 10×8cm of fascia lata and the left lateral femoral cutaneous nerve was elevated (Fig. 2). The ALT flap was folded in half, with the cranial side of the skin island at the oral cavity side and the caudal side at the skin side of the mental nerve. The medial and lateral sides of the fascia lata were partially processed into a string-like 1cm width, and the continuity with the remaining 8×8cm membranous fascia lata was kept by reinforcement with nonabsorbable sutures. Through a tunnel passing through the orbicularis oris muscle of the upper lip, the fascia strings were exposed to the mucosa side near the philtrum (Fig. 3). They were sutured to the orbicularis oris muscles with 3-0 nonabsorbable sutures so that the functional contraction

of the orbicularis oris muscle was transmitted to the fascia lata of the reconstructed lower lip. The membranous fascia lata in the folded ALT flap was sutured to the surrounding facial muscle stumps with 4-0 nonabsorbable sutures. The descending branch of the left lateral femoral circumflex artery and vein were end-to-end anastomosed microscopically to the right facial artery and the right external jugular vein with 10-0 nonabsorbable sutures, respectively. The left lateral femoral cutaneous nerve and right mental nerve were also sutured end-to-end with 6-0 nonabsorbable sutures. The total operative time was 10 hours, 17 minutes.

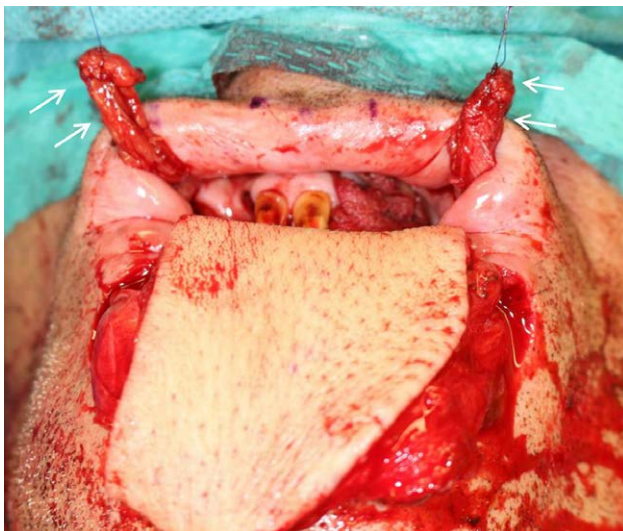
The pathological margin was negative with no lymph node metastasis (pT3N0M0). Three months after the first surgery, the ALT flap on the white labial side was replaced with a full-thickness skin graft on the fascia lata from the



**Fig. 1.** Details of the sensory reconstruction of a free ALT flap. The left lateral femoral cutaneous nerve and right mental nerve were sutured. The second surgery was a replacement of the ALT flap to regain the curve of the mental region of the chin by clavicle skin grafting; however, the reconstructed lip was retained for its sensory importance. Asterisks on the second surgery image show the points of sensory examination by Semmes-Weinstein monofilament and two-point discrimination tests.

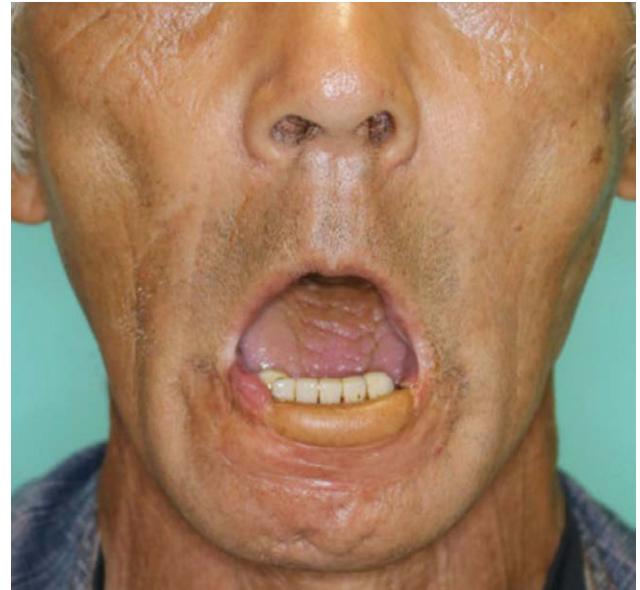


**Fig. 2.** A free anterolateral femoral flap from the left thigh. The skin island was 8×6 cm attached to 10×8 cm of fascia lata. White arrows show the fascia of each 1-cm width arranged in strings for suspension to the upper lip. Black arrows indicate the descending branch of the lateral femoral circumflex artery and veins. White arrowheads indicate the lateral femoral cutaneous nerve for sensory reconstruction.



**Fig. 3.** Intraoperative findings after suture of the oral side of the ALT flap. White arrows show the fascial strings passing through the orbicularis oris muscle of the upper lip from both corners of the mouth in a tunneling manner, which are exposed to the oral mucosa side at the philtrum.

clavicle as the second surgery. (See figure, **Supplemental Digital Content 1**, which shows the appearance before the second surgery, <http://links.lww.com/PRSGO/C561>.) No recurrence of the tumor has been observed in 6 years from the second surgery. The functional results were excellent: no restriction of opening and closing of the mouth, no drooling,



**Fig. 4.** Postoperative findings at 6 years after the second surgery (replacement of skin-side ALT flap with a skin graft from the clavicle performed at 3 months after the first reconstruction). Excellent functional and cosmetic results were obtained with sensory perception of the reconstructed lower lip.

ability to use a straw by contraction of the orbicularis oris muscle, and perceptibility of the reconstructed lower lip (Fig. 4). The patient avoided the intake of foods and drinks that are too hot (eg, hot coffee) due to hypersensitivity. Size 4.56 of the Semmes-Weinstein monofilament (4.0g) was perceptible, which meant diminished protective sensation. The patient could recognize contacts of the disk criminator of the two-point discrimination test; however, he could not distinguish even the distance of 15 mm. These findings showed decreased defense perception for touch sensing, but good protection level for high temperature sensing. The cosmetic results were excellent: a slim shape around the chin, color match, and texture match. (See figure, **Supplemental Digital Content 2**, which shows the closed mouth appearance at postoperative year 6, <http://links.lww.com/PRSGO/C562>.) We recommended the application of a medical tattoo to obtain red lips, but the patient did not wish to undergo the procedure. The donor-site damage was minimal: a linear scar at the left thigh with no motor impairment.

## DISCUSSION

Most reports of lower lip reconstruction using free flaps involved free radial forearm flaps.<sup>4,5</sup> Several reports described the use of free ALT flaps for larger defects, including upper lip and cheek defects, and as an alternative to the radial forearm flap.<sup>6-8</sup> The radial forearm flap has advantages in using a tendon of the palmaris longus muscle for suspension of the reconstructed lower lip, and in using a cutaneous nerve of the forearm for sensory reconstruction. However, it involves high donor invasiveness (eg, a remarkable scar on the wrist due to skin grafting to the donor site, sensory disturbance of the hand and forearm, and sacrifice of the radial artery). The sensory

free ALT flap is obviously less invasive to the donor and enables flap elevation and malignant tumor resection to be performed simultaneously; therefore, it is not only a good alternative<sup>6</sup> to the forearm flap but also has the advantages to reconstruct a larger defect with less invasiveness.

The reconstructed lower lip showed decreased defense perception for touch sensing, but good protection level for high temperature sensing. A study of a large number of total lower lip reconstructions including local flaps and free flaps showed that noninnervated flaps could be expected to recover sensory function by the phenomenon of reinnervation by the surrounding tissues.<sup>9</sup> However, a systematic review of tongue reconstruction indicated that sensory nerve coaptation of free flaps improves sensory recovery and clinical functional outcome.<sup>10</sup> The recovery of flap sensibility in lower lip reconstruction is needed for good functional outcomes; however, we found limited evidence, especially in large defects of lower lip. We need to accumulate more clinical cases with long-term observation.

The limitation of this technique is over-volume of the ALT flap in subcutaneous tissue, which results in an excessively thick flap, especially in obese patients. However, this problem can be overcome by performing a thinning procedure at the initial surgery or by reducing the volume at the second surgery.<sup>11</sup> Also, risk reduction surgical methods, including identification of the perforator courses in subcutaneous tissue using preoperative photoacoustic imaging and intraoperative guide surgery, have been developed.<sup>12</sup> The level of microsurgical techniques has improved in the last 10 years. We believe that with the improvement and generalization of free flap surgical techniques, lower lip reconstruction using a sensory ALT flap has the potential to be selected as the first choice for lower two-thirds to total lower lip defects.

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## DISCLOSURE

*The authors have no financial interest to declare in relation to the content of this article.*

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